The Great Circuit

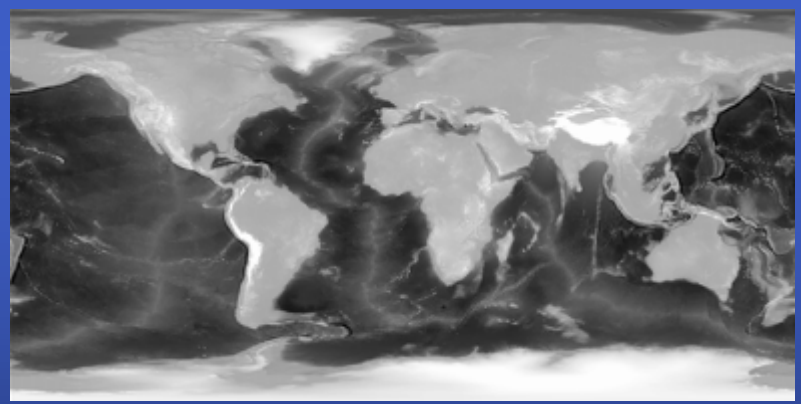
Finding the Longest Great Circle With Respect to Terrain

Presented by Keith French

Purpose & Data Requirements

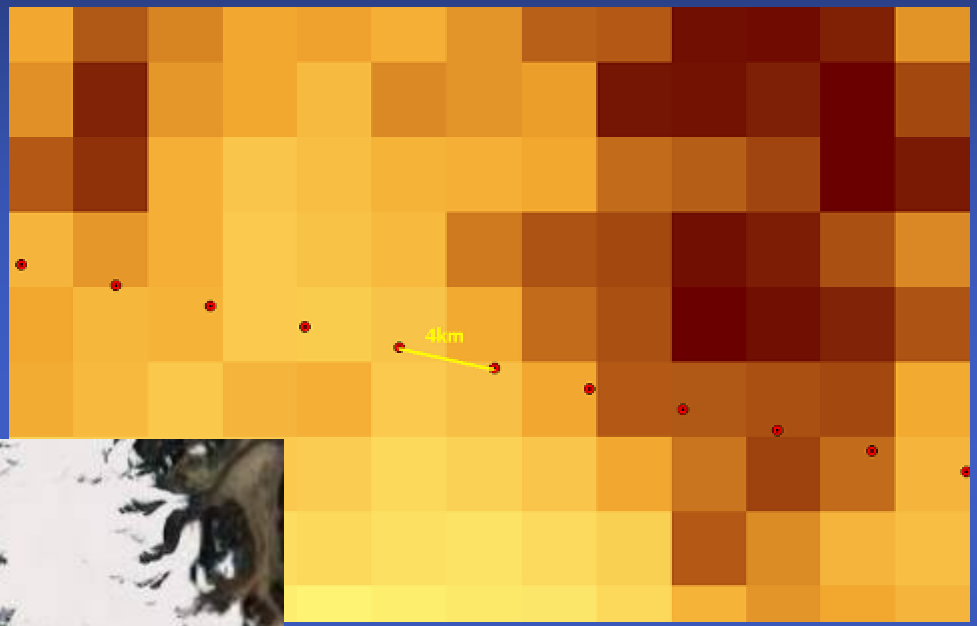
- Find Longest and Shortest Circles:
  - Sea Floor, Surface, & Exclusion
- Using Dataset:

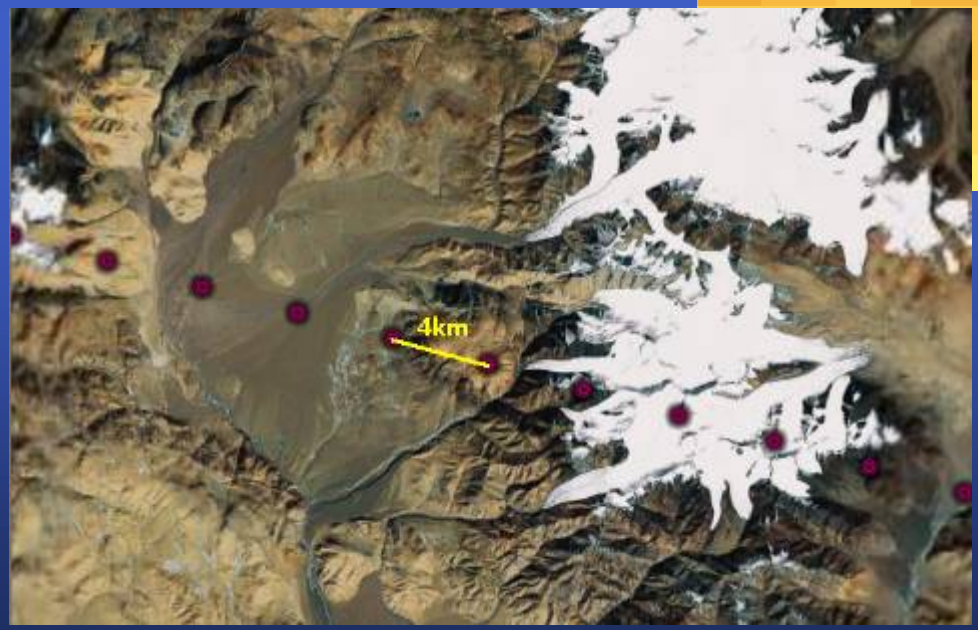
  ETOPO2 DEM
  - Global Coverage
  - 2’ Resolution



Purpose & Data Requirements

The ETOPO 2 Digital Elevation Model

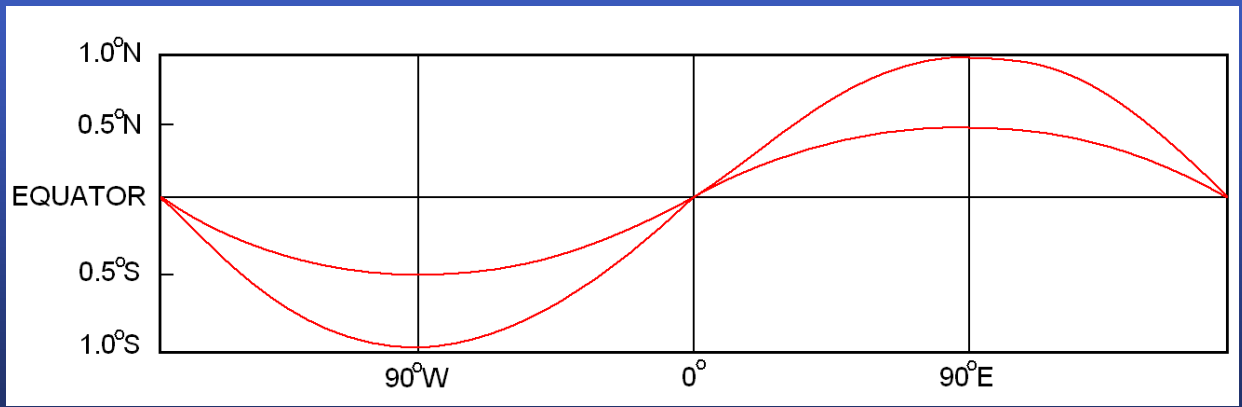




Google Earth Imagery

Methods

- Derive a Sample of Great Circles:
  - 720 points of longitude along equator
    - ✓every half degree around the globe
  - 180 circles at each longitude
    - ✓half degree intervals from 0.5° to 90°
  - 1 Equator
  - (720 x 180) + 1 = 129,601 circles to be examined.

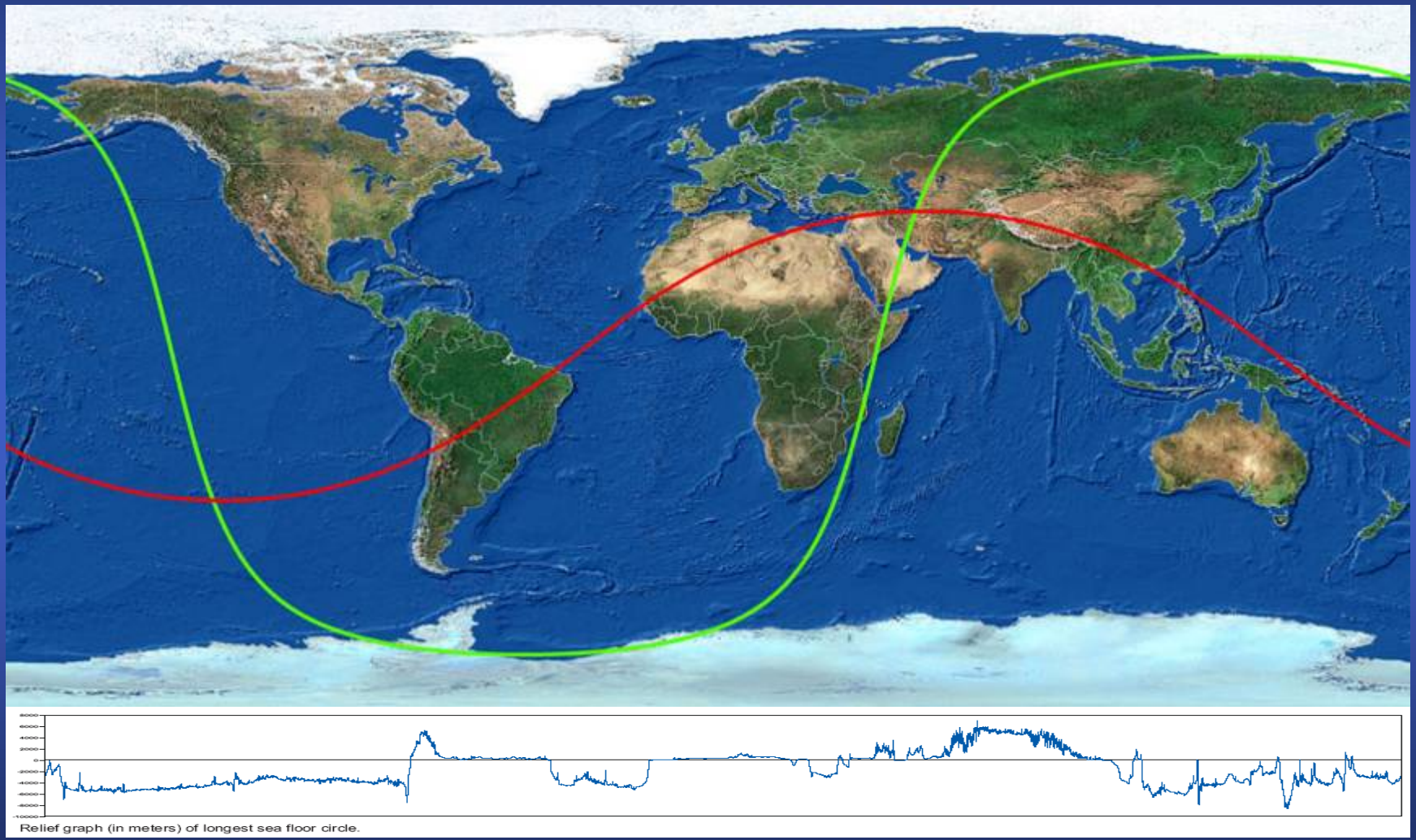


Methods

- Calculate Each Sample Circle's Length
  - VBA Code in ArcMap:
    - ✓Cycle through each sample circle.
    - ✓Examine each at approximate 2 minute intervals (to match ETOPO 2 resolution).
    - ✓Using elevation data from ETOPO, calculate surface distance.
    - ✓Keep track of longest and shortest circles.
    - ✓Export circles as shapefiles.

Results

Sea Floor

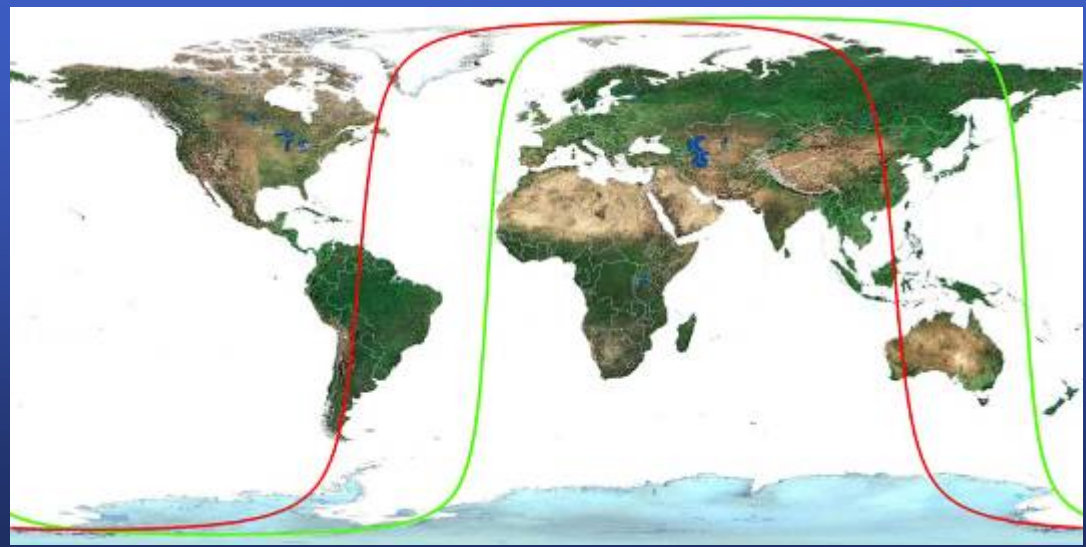


Relief graph (in meters) of longest sea floor circle.

Results

Sea Surface

Sea Exclusion



Further Issues

- Sample size & selective sampling
- Ellipsoid vs. spheroid
- Digital Elevation Model resolution
- Algorithm & Code optimization